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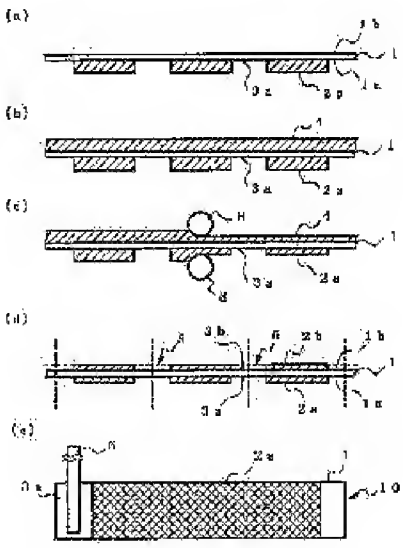
(54) SEALED BATTERY ELECTRODE PLATE AND ITS MANUFACTURE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an electrode plate having excellent quality and a manufacturing method that can produce the electrode plate and improve productivity.
SOLUTION: This electrode plate is manufactured by performing at least a process to form an applied part 2a to which an active material 4 is applied and a non-applied part 3a to which the active material 4 is not applied by intermittently applying the active material 4 to one plate surface 1a of a collector 1, a process to apply the active material 4 to the entire other surface 1b of the collector 1, and a process to form, on the other surface 1b, an applied part 2b to which the active material 4 is applied and a non-applied part 3b to which the active material 4 is not applied by peeling the active material 4 from regions 5 on the other surface 1b of the collector 1 corresponding to the non-applied part 3a.



DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to an electrode plate which constitutes the power generation element of an encapsulated type battery, and a manufacturing method for the same.
[0002]
[Description of the Prior Art]An encapsulated type battery encloses the power generation element for performing power generation and charge and discharge in a battery can, and is constituted. For example, in a lithium ion battery, a nickel cadmium cell, etc., a separator is inserted between the electrode plate for anodes, and the electrode plate for negative electrodes, and the power generation element which rolled this spirally and formed it is used. As for the electrode plate which constitutes this power generation element, it comes to form in both sides of metal plates (charge collector) the non-coating part by which coating of the active material is not carried out to the coating part to which coating of the active material was carried out. The manufacturing method of an electrode plate is roughly divided into two by the difference in the formation method of a non-coating part. A non-coating part may be formed by the case where it is formed by an intermittent coating method, and exfoliation.
[0003]Drawing 3 is a figure showing an example of the manufacturing method of the electrode plate of the conventional encapsulated type battery.
The non-coating part is formed by the intermittent coating method.
The sectional view shows drawing 3 (a) - (c), and the top view shows drawing 3 (d). Drawing 3 (a) is a figure showing the coating process which carries out coating of the active material to a charge collector. Coating of the active material is carried out to both sides of the charge collector 1 by the intermittent coating method, and the non-coating part 3 by which coating of the active material is not carried out to the coating part 2 to which the active material was applied is formed in the charge collector 1. Drawing 3 (b) is a figure in which it is shown like a roll turner. The coating part 2 provided in both sides of the charge collector 1 is rolled with the reduction roll 8, and is formed in desired thickness. Drawing 3 (c) is a figure showing a cutting process. The charge collector 1 is disconnected by the non-coating part 3 (dotted line in a figure), and each cut member is completed as an electrode plate. Drawing 3 (d) is a figure showing the completed electrode plate 10. The electrode tab 6 for connecting with the terminal of a cell is welded to the non-coating part 3.
[0004]Drawing 4 is a figure showing the intermittent coating method in the manufacturing method shown in drawing 3. Drawing 4 (a) shows the place which forms the coating part 2 to the charge collector 1, and drawing 4 (b) shows the place which forms the non-coating part to the tabular charge collector 1. As shown in drawing 4 (a), the charge collector 1 is sent out in the direction of an arrow with the roll A, C, and D. The roll B has sent out the paste state active material 4. If the charge collector 1 passes along between the rolls A and B, coating of the active material 4 will be carried out to one field of a charge collector with the roll B, and the coating part 2 will be formed. 7 is a top roll for adjusting coating thickness. As shown in drawing 4 (b), the roll A is constituted movable. If the coating part 2 of predetermined length is formed, the roll A will move so that coating of the active material 4 may not be carried out to the charge collector 1, and will form a non-coating part.
[0005]By the way, in the manufacturing method using the above-mentioned intermittent coating method, in order to form the non-coating part 3, it is necessary to move a roll. Therefore, there is a problem that it is difficult to shorten the coating time of an active material, and improvement in productivity cannot be aimed at. Since it sets like a roll turner and the elongation of the charge collector 1 differs by the coating part 2 and the non-coating part 3, a wave (distortion) may occur in the whole charge collector. When this wave (distortion) rolls the produced electrode plate spirally with a separator, it makes an anode board and a negative electrode plate produce gap, and may generate the short circuit of an anode board and a negative electrode plate.
[0006]Drawing 5 is a figure showing other examples of the manufacturing method of the electrode plate of the conventional encapsulated type battery.
The non-coating part is formed by exfoliation.
Drawing 5 (a) The sectional view shows - (c) and the top view shows drawing 5 (d). Drawing 5 (a) is a figure showing the coating process which carries out coating of the active material to a charge collector. Coating of the paste state active material 4 is carried out to whole both sides of the charge collector 1. Drawing 5 (b) is a figure in which it is shown like a roll turner. The active material 4 by which coating was carried out is rolled with the reduction roll 8, and let it be desired thickness. Drawing 5 (c) is a figure showing a peeling process and a cutting process. The active material of the

predetermined field 5 exfoliates and the coating part 2 and the non-coating part 3 are formed in the charge collector 1. The method using the masking tape as a peeling method and the method (JP,63-40253,A, JP,2-186557,A, JP,8-255611,A) using supersonic vibration are known. The charge collector 1 is disconnected in the non-coating part 3 (bold dotted line in a figure), and each cut member is completed as an electrode plate. Drawing 5 (d) is a figure showing the completed electrode plate 10. The electrode tab 6 for connecting with the terminal of a cell is welded to the non-coating part 3 like drawing 3 (d).

[0007]

[Problem(s) to be Solved by the Invention]Thus, in the manufacturing method which forms a non-coating part by exfoliation, since it is not necessary to move a roll, the coating time of an active material can be shortened. Since it rolls before forming a non-coating part, it can control that a wave occurs in a charge collector.

[0008]However, since shortening of the time which exfoliation of an active material takes is difficult, there is a problem that improvement in productivity cannot be aimed at like the manufacturing method of the place above-mentioned which is a join office. In the state before rolling, the adhesive property to the charge collector of an active material is low, and since it is necessary to perform a peeling process at the back like a roll turner, fine unevenness will be formed in the surface of a non-coating part. Therefore, there is a problem that the electrical property and weldability of the electrode tab attached to the non-coating part will be inferior compared with the method mentioned above. Removal of this unevenness is very difficult. It is necessary to check whether the active material has exfoliated thoroughly, and there is also a problem that the part cost becomes high.

[0009]There is a technical problem of this invention in providing the manufacturing method of the electrode plate which solves an aforementioned problem and has the outstanding quality, and the electrode plate which can produce the electrode plate and can aim at improvement in productivity.

[0010]

[Means for Solving the Problem]A manufacturing method of an electrode plate of an encapsulated type battery of this invention has the following feature.

(1) Are a manufacturing method of an electrode plate of an encapsulated type battery, and coating of the active material is intermittently carried out to one field of ** charge collector, A process of forming a non-coating part by which coating of the active material is not carried out to a coating part to which coating of the active material was carried out, ** Exfoliate an active material of a field corresponding to said non-coating part in a field of a process of carrying out coating of the active material all over a field of another side of a charge collector, and another side of ** charge collector, A manufacturing method of an electrode plate of an encapsulated type battery having at least the process of forming in a field of another side of a charge collector a non-coating part by which coating of the active material is not carried out to a coating part to which coating of the active material was carried out.

[0011](2) In a process of the above-mentioned **, adhesive tape is stuck so that a field of a field of another side corresponding to a non-coating part of one field may be covered at least, A manufacturing method of an electrode plate of an encapsulated type battery of the above-mentioned (1) statement which heats and/or pressurizes one non-coating part and said field of a field, removes said adhesive tape, and exfoliates an active material.

[0012](3) the above -- ** -- a process -- the above -- ** -- a process -- having ended -- after -- a charge collector -- one side -- a field -- forming -- having had -- a coating part -- another side -- a field -- the whole surface -- coating -- carrying out -- having had -- an active material -- rolling -- a process -- having -- **** -- the above -- (-- one --) -- a statement -- an encapsulated type battery -- an electrode plate -- a manufacturing method .

[0013](4) the above -- ** - ** -- a process -- setting -- plurality -- a coating part -- plurality -- un--- a coating part -- alternation -- continuing -- forming -- having -- **** -- the above -- ** - ** -- a process -- having ended -- after -- a charge collector -- un--- a coating part -- cutting -- a process -- having -- the above -- (-- one --) -- a statement -- an encapsulated type battery -- an electrode plate -- a manufacturing method .

[0014](5) A manufacturing method of an electrode plate of an encapsulated type battery of the above-mentioned (1) statement which has the process of welding and attaching an electrode tab for connecting with a terminal of an encapsulated type battery to a non-coating part formed in the above-mentioned intermittent target by carrying out coating of the active material.

[0015]An electrode plate of an encapsulated type battery of this invention has the following feature. (6) The above (1) Electrode plate of an encapsulated type battery being manufactured with a manufacturing method of a statement by either of - (5).

[0016]

[Function]As described above, in the manufacturing method of the electrode plate of this invention, the non-coating part of one field of a plate carries out coating of the active material intermittently, and is formed, and the non-coating part of the field of another side is formed by exfoliating an active material. Therefore, coating time can be shortened compared with the manufacturing method of only intermittent coating. Even if the exfoliating above-mentioned active material is rolled, since the field where the field of the opposite hand of this active material corresponds in the case of rolling serves as a non-coating part, it is what has low adhesion with a charge collector compared with the case where it is shown in drawing 5. Therefore, this active material can exfoliate easily and can shorten the time which exfoliation takes in this invention. Since exfoliation is performed only on one side, the time which the quality identification of the surface of separation takes can also be shortened.

[0017]

[An embodiment of the invention, an example] Hereafter, this invention is explained in detail using figures. Drawing 1 is a figure showing the electrode plate of the encapsulated type battery of this invention, and an example of the manufacturing method. Drawing 1 (a) The sectional view shows - (d) and the top view shows drawing 1 (e). As shown in the example of

drawing 1, the electrode plate 10 of the encapsulated type battery of this invention, (1) The process of forming the non-coating part 3a by which coating of the active material is not carried out to the coating part 2a which carries out coating of the active material to one field 1a of the charge collector 1 intermittently, and by which coating of the active material was carried out to it, (2) In the field 1b of the process of carrying out coating of the active material 4 all over the field 1b of another side of the charge collector 1, and another side of the (3) charge collector 1, The active material of the field 5 corresponding to the non-coating part 3a is exfoliated, and coating part 2b to which coating of the active material was carried out, and an active material are manufactured through the process of forming the non-coating part 3b by which coating is not carried out, at least.

[0018]Drawing 1 (a) shows the process of carrying out coating of the active material intermittently, and following one field 1a of the charge collector 1 by turns, and forming two or more coating parts 2a and two or more non-coating parts 3a in it. Drawing 1 (b) shows the process of carrying out coating of the active material 4, all over the field 1b of another side of the charge collector 1. Drawing 1 (c) shows the process of rolling the charge collector 1. The active material 4 by which coating was carried out to the coating part 2a is formed in desired thickness by the reduction roll 8. In the field 1b of another side of the charge collector 1, drawing 1 (d) exfoliates the active material 4 of the field 5 corresponding to the non-coating part 3a, and shows the process of forming coating part 2b and the non-coating part 3b. Although the active material 4 of the field 5 is rolled, since the field of the opposite hand is the non-coating part 3a, the adhesion with a charge collector is small and is in the state where it can exfoliate easily. The charge collector 1 is disconnected in the non-coating parts 3a and 3b (bold dotted line in a figure), and each cut member is completed as an electrode plate. Drawing 1 (e) shows the process of attaching the electrode tab 6 for connecting with the terminal of a cell to a non-coating part, and the electrode plate 10 of completed this invention. The electrode tab 6 is welded to the non-coating part 3a formed in one field 1a.

[0019]Thus, in the manufacturing method of this invention, in one field 1a of the charge collector 1, the non-coating part 3a is formed by carrying out coating of the active material intermittently, and the non-coating part 3b is formed by exfoliation in the field 1b of another side. Therefore, if the electrode plate of an encapsulated type battery is manufactured with the manufacturing method of this invention, improvement in productivity can be aimed at compared with the former.

[0020]Since it is only one side that the coating part and the non-coating part are formed before rolling, the wave (distortion) produced in a charge collector in the case of rolling is small compared with the former, and when the completed electrode plate is rolled spirally, a problem like before does not produce it. Since the electrode tab 6 is attached to the non-coating part 3a formed by carrying out coating of the active material intermittently as shown in drawing 1 (e), unlike the conventional method of forming a non-coating part only by exfoliation of an active material, it is not necessary to check the desquamative state in a non-coating part. Even if unevenness is formed in the non-coating part 3b formed by exfoliation, an adverse effect does not arise in the electrical property or weldability of an electrode tab.

[0021]Although the intermittent coating method used from the former mentioned above as a method of carrying out coating of the active material intermittently in this invention can be used, what is necessary is just a method which is not limited to this and can carry out coating of the active material selectively on the field of a charge collector.

[0022]Drawing 2 is a figure showing other examples of the manufacturing method of the electrode plate of the encapsulated type battery of this invention. Drawing 2 shows only the process of exfoliating the active material by which coating was carried out all over one side of a charge collector, and forming a coating part and a non-coating part. By sticking the adhesive tape 21 so that the field 5 of the field 1b of another side corresponding to the non-coating part 3a may be covered at least, heating and pressurizing the non-coating part 3a and the field 5, and removing the adhesive tape 21, as shown in the example of drawing 2, The active material 4 in the field 5 exfoliates, and coating part 2b and the non-coating part 3b of the field 1b of another side are formed.

[0023]Drawing 2 (a) shows the process of sticking the adhesive tape 21. The adhesive tape 21 has covered the field 1b of another side of a charge collector from on the active material 4. Drawing 2 (b) shows the process of heating and pressurizing the non-coating part 3a and the field 5. Heating and application of pressure are performed by the thermal head 22. Drawing 2 (c) shows the process of removing the adhesive tape 21. The active material in the field 5 exfoliates with the adhesive tape 21, and the non-coating part 3b is formed in the field 5.

[0024]Thus, if the non-coating part 3a formed by carrying out coating of the active material intermittently and the field 5 corresponding to it are heated and pressurized and an active material is exfoliated with adhesive tape, Exfoliation time can be shortened compared with the peeling method using the conventional masking tape, or the peeling method using an ultrasonic wave, and improvement in productivity can be achieved.

[0025]The electrode plate of this invention can be used for either an anode or a negative electrode. The electrode plate of this invention may be used rolling it spirally, and may laminate and use two or more sheets. As an encapsulated type battery which can use the electrode plate of this invention, a lithium ion battery, a nickel cadmium cell, a nickel hydoride battery, etc. are mentioned.

[0026]As a charge collector which constitutes an electrode plate, what is used from the former, such as aluminium foil and copper foil, can be used, and it is not limited in particular. An active material in particular is not limited and what is necessary is just to choose it according to the kind of the above-mentioned encapsulated type battery.

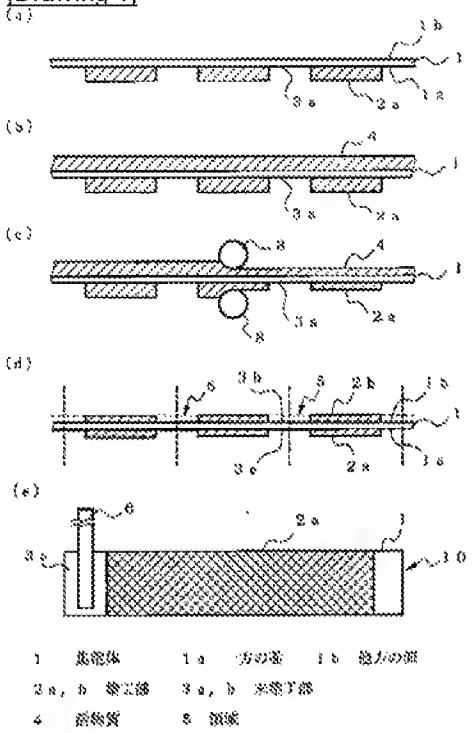
[0027]

[Effect of the Invention]If the manufacturing method of this invention is used like the above explanation, productivity can be raised compared with the former. The manufactured electrode plate has the quality outstanding compared with the conventional electrode plate.

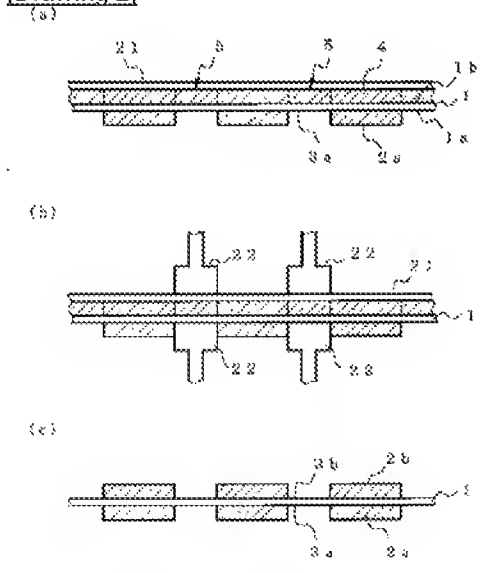
[Translation done.]

DRAWINGS

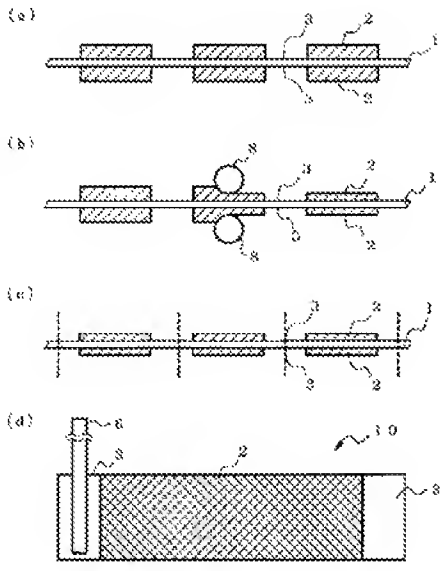
[Drawing 1]



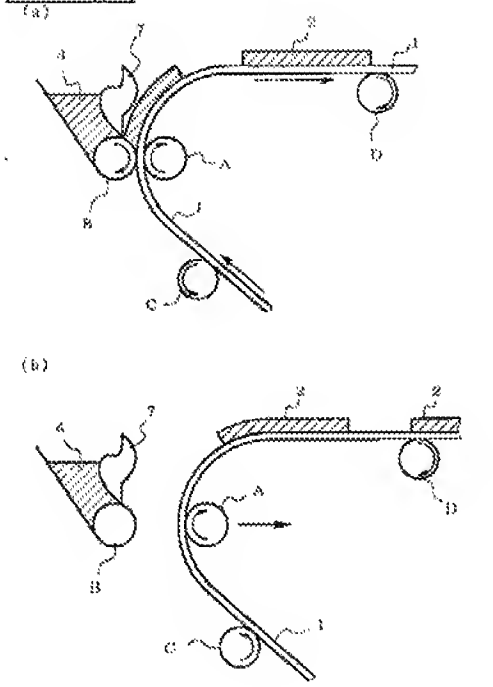
[Drawing 2]



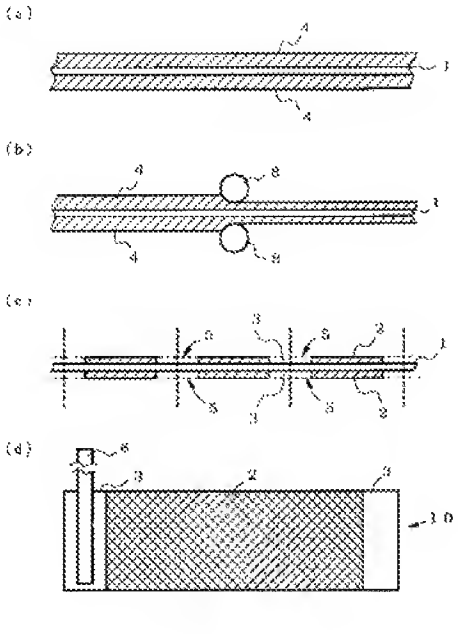
[Drawing 3]



[Drawing 4]



[Drawing 5]



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